

Health Consultation

DURACELL

CLEVELAND, BRADLEY COUNTY, TENNESSEE

TDOR SITE #06-505

MARCH 29, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR that, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

DURACELL

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TDOR SITE #06-505

Prepared by:

Tennessee Department of Health
Under a Cooperative Agreement with
The Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

In January 2005, the Tennessee Department of Environment and Conservation (TDEC), Division of Remediation (DOR), Chattanooga Field Office, contacted the Tennessee Department of Health (TDH), Environmental Epidemiology (EEP). DOR informed EEP of complaints regarding mercury at Duracell, TDEC-DOR (TDOR) Site #06-505. The Duracell facility is located at 501 Mouse Creek Road NW, Cleveland, Bradley County, Tennessee, 37312 (Figure 1).

Anonymous complaints were reported to United States Environmental Protection Agency (EPA) and TDOR in November and December 2004. The complainants alleged that there were elevated levels of mercury present in the nail room and in the men's and women's shower rooms. DOR requested assistance from TDH and EPA to assess the situation and determine whether exposure to mercury vapors was occurring. Though plans had been made for air sampling of the Soil Vapor Extraction System (SVES) in March 2005, the serious nature of the complaint allegations prompted EEP to request a site visit sooner.

The Duracell manufacturing facility was established in its current location in 1961. Duracell has been voluntarily investigating the environmental impact of this site since the late 1980s. Environmental sampling of the site revealed elevated levels of volatile organic compounds (VOCs) and metals associated with the manufacturing processes at the site. However, even though mercury was utilized in the manufacturing process at this facility, it was not considered as a constituent of concern (COC). The environmental remediation efforts at Duracell in past years has focused mainly on the clean up and removal of VOCs (tetrachloroethylene being the most prominent VOC) from the groundwater. In addition to pumping and treating VOC laden groundwater, the SVES is used to pull VOC vapors, via an underground vacuum system, from the soil and then vent them to the atmosphere. The facility began to phase out the use of mercury in 1988, and its use was completely eliminated from its manufacturing process by 1992. During the period of time mercury was utilized, its use was confined to one specific room within the facility, referred to as the *nail room*.

A site visit was scheduled for February 24, 2005. For additional investigative support, EEP contacted Bob Safay with the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, for assistance in conducting real-time mercury vapor monitoring at Duracell. Mr. Safay, in turn, secured assistance from the EPA Region 4, in arranging the use of their air-monitoring equipment. During the tour, Mr. Timothy Neal from EPA conducted the air monitoring activities with an Ohio Lumex RA-915 Light (Lumex), portable real-time mercury vapor analyzer (Figures 2 & 3).

Discussion

Environmental Sampling

The planned site visit was conducted at the Duracell facility on February 24, 2005. Duracell personnel conducted representatives of TDH, TDOR, EPA, and ATSDR on a tour of the facility. The main focus of the tour was to conduct real-time air monitoring for mercury vapor levels in the areas of the facility alleged to have elevated mercury vapors by the anonymous complainants.

The Lumex is a real-time mercury vapor analyzer. It can detect mercury vapor concentration levels from 0.1 $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter) to 100 $\mu\text{g}/\text{m}^3$. Its air intake rate (i.e. sampling flow rate) is 10 liters per minute and it provides real-time data at a rate of 1 sample result per second. Thus, the Lumex provides virtually instantaneous and accurate readings of mercury vapor concentrations in the air.

Mr. Neal started the Lumex and began observing the air sampling data in the manufacturing area just as the group left the facility offices. The Lumex began to detect mercury vapor at that point. Table 1 provides a summary of the air sampling data obtained during the tour of the Duracell facility.

TABLE 1. Lumex RA-915 Light real-time mercury vapor measurements collected on Thursday, February 25, 2005, at the Duracell site, Cleveland, Bradley County, TN.		
Location	Mercury Vapor $\mu\text{g}/\text{m}^3$	Height of Air Sample (inches above floor level)
manufacturing area, just outside doors to office	0.3	48 to 60
nail storage area (near entrance of nail room from the main manufacturing area)	0.4	48 to 60
nail room* (near center of room)	0.7	48 to 60
nail room floor drain (near wall opposite of room entrance), Figure 2	>100.0	0 to 4
breathing zone above floor drain	1.6	60 to 72
nail room, far corner	0.7	48 to 60
breathing zone in nail room (near center of room)	0.5	60 to 72
men's shower floor drain	0.0	0 to 4
women's shower floor drain	0.0	0 to 4
breathing zone in manufacturing area, amongst machinery	0.0	60 to 72
manufacturing area, over floor cover to pilot injection study monitoring well	0.0	0 to 4
manufacturing area monitor well (sampled air from inside monitor well casing)	0.8	0 to -2
soil vapor extraction system (SVES) exhaust pipe air sampling valve, Figure 3	8.9**	N/A
manhole near air sampling valve	0.2	0 to 4
within the SVES machinery room	0.0	48 to 60
facility wastewater discharge outfall pipe	0.0	N/A
NOTES: > measurement exceeded the machine's maximum concentration * current term for the former <i>anode</i> or <i>powder room</i> where mercury use historically occurred ** measurement was a 10 second average concentration		

Exposure Limits

Several environmental and occupational health standards have been set for mercury exposure. Occupational (or industrial) standards are generally based upon preventing adverse health effects from exposure over a 40-hour workweek. Environmental standards are utilized for locations other than industrial-type environments. The most common application for environmental exposure standards is for residential-type settings.

OSHA PEL

The Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for mercury vapor is $100 \mu\text{g}/\text{m}^3$ of air as a ceiling limit. This means a worker's exposure to mercury vapor shall at no time during the workday exceed this ceiling level. Thus, the OSHA PEL represents legal or regulatory industrial standard.

NIOSH REL

The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit (REL) for mercury vapor of $50 \mu\text{g}/\text{m}^3$ as a time weighted average (TWA) for up to a 10-hour workday and a 40-hour workweek. NIOSH also assigns a "Skin" notation, which indicates that the cutaneous route of exposure, including mucous membranes and eyes, contributes to overall exposure. The NIOSH limit is based on the risk of central nervous system damage, eye, skin, and respiratory tract irritation. NIOSH RELs are occupational recommendations and are not government regulations.

ATSDR MRL

The Agency for Toxic Substances and Disease Registry (ATSDR) has established a minimal risk level (MRL) and an action level for residential indoor exposures to mercury. The ATSDR MRL for mercury vapor is $0.2 \mu\text{g}/\text{m}^3$, and is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse health effects over a specified period of time. The ATSDR action level for mercury vapor is $1.0 \mu\text{g}/\text{m}^3$. This is the level, which triggers remediation if exceeded in indoor air.

EPA Reference Concentration

The EPA sets a reference concentration of $0.3 \mu\text{g}/\text{m}^3$ for inhalation exposure of mercury. Adverse health effects do not necessarily result from exposure at the reference concentration. It is utilized as a screening tool and where indoor air mercury levels exceed the reference concentration, EPA would further investigate the exposure.

Mercury Levels at Duracell

In order to assess the mercury vapor data obtained at Duracell in the proper prospective, the appropriate human exposure limit standard must be selected. Since this site is an active manufacturing facility, the applicable standard would be the OSHA PEL. The PEL for mercury vapor is $100 \mu\text{g}/\text{m}^3$.

All of the air sampling data for Duracell is shown in Table 1. Twelve of the recorded mercury vapor measurements were from inside the facility building. Eleven of the twelve concentration readings are below $100 \mu\text{g}/\text{m}^3$.

The air sampling point that exceeded $100 \mu\text{g}/\text{m}^3$ was at floor level (Figure 2), above a drain in the nail room floor. Since mercury use was confined to the nail room, and floor drains are a common collection point for waste materials in any manufacturing facility, this mercury vapor reading was not surprising. The next highest mercury vapor concentration was found in the breathing zone directly above the floor drain. The concentration at that point was $1.6 \mu\text{g}/\text{m}^3$. The other four mercury vapor-sampling points in the nail room did not exceed $1.0 \mu\text{g}/\text{m}^3$. Mercury vapor readings from the men's and women's shower room floor drains were $0.0 \mu\text{g}/\text{m}^3$.

Mercury (Hg)

Mercury is a naturally occurring metal found throughout the environment. Mercury enters the environment as the result of the normal breakdown of minerals in rocks and soil. Because mercury occurs naturally in the environment, everyone is exposed to very low levels of mercury in air, food, and water. Human activities since the start of the industrial age have resulted in the additional release of mercury to the environment. Most of the mercury found in the environment is in the form of metallic mercury and inorganic mercury compounds. Metallic mercury (also known as quicksilver) is a liquid at room temperature, but some of the metal will evaporate into the air and can be carried long distances. Mercury vapor is odorless, colorless, and tasteless. If the metallic mercury is not properly cleaned, the mercury can remain for months or years, and continue to be a source of exposure.

Inhalation of high levels of elemental mercury, over extended periods of time, can cause permanent neurological damage and kidney impairment. A case study (ATSDR 1999) examined an acute mercury vapor exposure to industrial workers at concentrations in excess of $10,000 \mu\text{g}/\text{m}^3$ for up to 16 hours. The exposure produced depression, anxiety, phobias, psychotic-like behavior, and indications of peripheral nerve damage.

Children's Health Considerations

During this mercury vapor investigation of Duracell, an industrial facility, it was noted that no children are employed at the site. Furthermore, no threats unique to children living in nearby neighborhoods that would require special attention were identified.

Conclusions

1. No apparent health hazard exists from mercury vapor levels detected in the nail room, men's shower room, or women's shower room inside the Duracell, Cleveland facility (TDOR Site #06-505).

Recommendations

1. As a matter of prudent public health practice, the floor drain in the nail room should be thoroughly cleaned in order to remove an apparent source of mercury vapor.

Public Health Action Plan

1. TDH EEP will provide copies of this health consultation to TDOR Central Office, Nashville, TDOR Field Office, Chattanooga, and the management of Duracell, Cleveland.
2. TDH EEP is available to review additional data.
3. TDH EEP will continue to work with TDOR as needed to respond to environmental public health questions regarding the Duracell site.

References

[ATSDR] Agency for Toxic Substances and Disease Registry. 2004. Air comparison values. Atlanta: US Department of Health and Human Services.

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[NIOSH] National Institute for Occupational Safety and Health. 2004. Pocket Guide to Chemical Hazards. Atlanta: US Department of Health and Human Services.

[OSHA] Occupational Safety and Health Administration. 2005. Permissible Exposure Limits. Available online: <http://www.osha.gov/SLTC/pel/> Last accessed: March 8, 2005.

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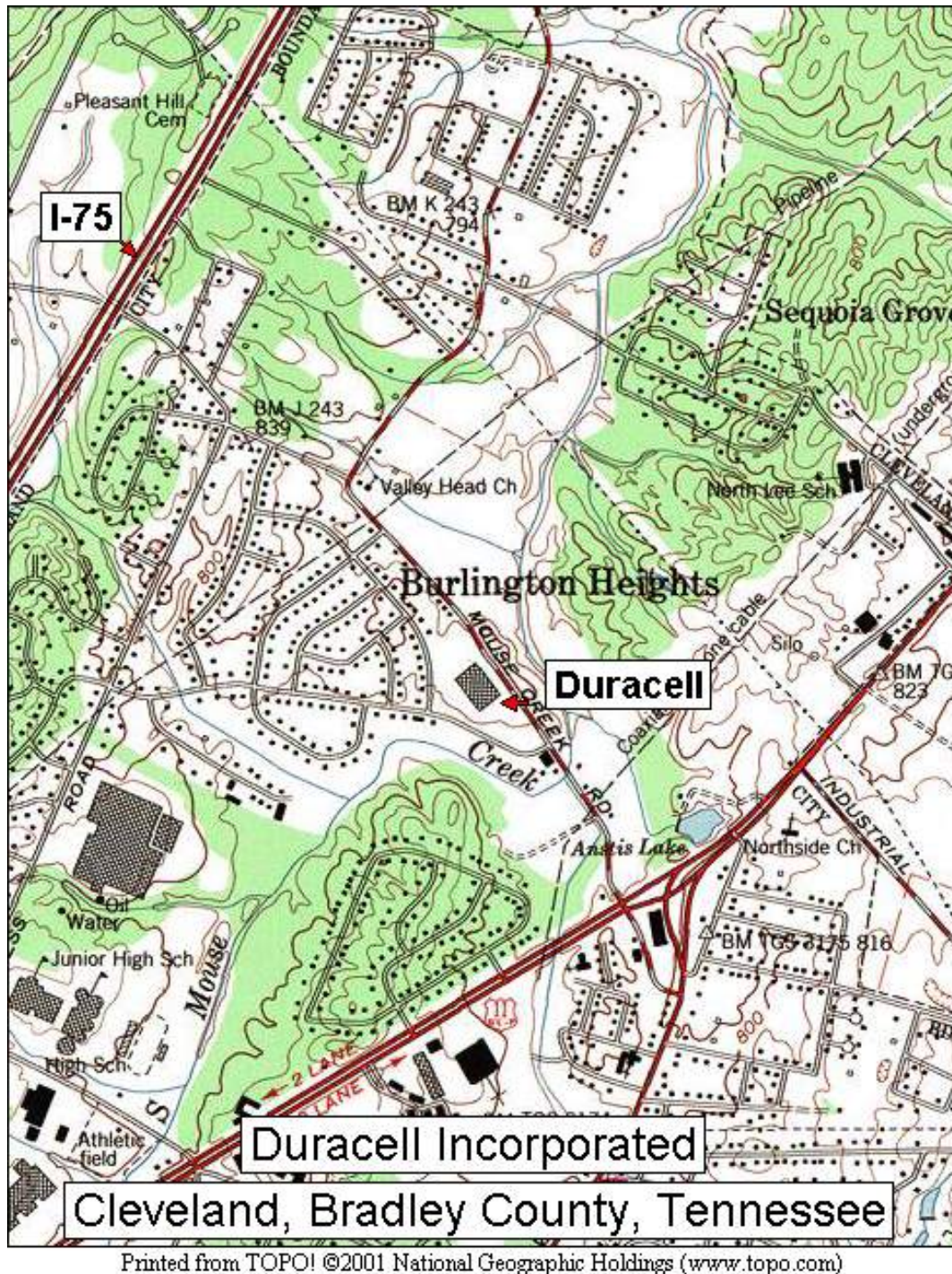
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FIGURE 1 - Site location map. Duracell, TDOR Site #06-505.



(Map credit: National Geographic Society, TOPO!)

FIGURE 2 - EPA staff using the Ohio Lumex RA-915 Light (Lumex) to analyze real-time air samples from the floor drain in the nail room. Duracell, Cleveland, Bradley County, Tennessee (Photo credit: Bob Safay, ATSDR, February 24, 2005)



FIGURE 3 - EPA staff using the Lumex to analyze real-time air samples from the SVES exhaust pipe air-sampling valve. Duracell, Cleveland, Bradley County, Tennessee (Photo credit: Bob Safay, ATSDR, February 24, 2005)



Certification

This Health Consultation: Town and Country Cleaners, Nashville, Davidson County, Tennessee, was prepared by the Tennessee Department of Health Environmental Epidemiology under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation way begun.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

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